

NON-PUBLIC?: N  
ACCESSION #: 8803140157

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Washington Nuclear Plant - Unit 2 PAGE: 1 of 9

DOCKET NUMBER: 05000397

TITLE: Reactor Scram Due To Main Steamline Isolation Caused By Personnel  
Error During Surveillance Testing

EVENT DATE: 02/04/88 LER #: 88-003-00 REPORT DATE: 03/07/88

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Steven L. Washington, Compliance Engineer TELEPHONE #: 509-377-2080

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: BN COMPONENT: MO MANUFACTURER: L200

REPORTABLE TO NPRDS: N

CAUSE: X SYSTEM: SB COMPONENT: PS MANUFACTURER: B070

REPORTABLE TO NPRDS: 4

CAUSE: X SYSTEM: AA COMPONENT: ZE MANUFACTURER: G082

REPORTABLE TO NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT: On February 4, 1988, while operating at rated power, at 0150 hours, Plant Instrument and Control (I&C) Technicians inadvertently caused the Main Steamline Isolation Valves (MSIVs) to close, which in turn caused the Reactor to scram when the MSIVs reached the 10 percent-closed position.

The I&C Technicians initiated the event by simultaneously tripping one Low Condenser Vacuum channel in each MSIV closure trip system (one out of two twice logic) causing a Nuclear Steam Supply Shutoff System (NSSSS) Group 1 MSIV isolation. The immediate Plant response was as expected. All four Reactor Protection System (RPS) MSIV closure channels tripped and initiated a Reactor scram. Four of the 18 Main Steamline Safety Relief Valves (SRVs) automatically opened to attenuate the reactor pressure transient. Plant Reactor Operators manually initiated the Reactor Core Isolation Cooling (RCIC) System to inject water to the reactor, and they manually opened SRVs to

control Reactor pressure. The Reactor water level swell associated with opening the SRVs exceeded the Reactor high water level trip setpoint which caused the RCIC System to shutdown. The maximum reactor water level reached during the event was +78 inches well below the bottom of the Main Steamlines. When reactor water level dropped below the Reactor high water level trip setpoint, the RCIC System was restored. The Plant was maintained in Hot Shutdown (Plant Mode 3) until it was restarted on February 5, 1988 at 1300 hours.

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In addition to the events described above, the following actuations occurred during the event. The reactor water level decreased through the low level (Level 3) trip setpoint and both Reactor Recirculation Pumps tripped from fast to slow speed. The Main Turbine tripped when the RCIC system was initiated. Both Reactor Feedwater Pumps tripped when the reactor water level reached the high level (Level 8) trip setpoint.

The following Plant problems were noted during the event. None of the problems noted had a major impact on the event. SRV (MS-RV-3B) lifted below its trip setpoint. The RCIC Condensate Test Return Flow Control Valve (RCIC-V-22) did not fully close and the valve position indication erroneously showed the valve closed. After the scram, reactor operators had no position information for Control Rod 10-27. One of two Narrow Range Suppression Pool Level Indicating Recorders (CMS-LR-3) stuck during the event. The Turbine Bypass Valve Control shifted from Auto to Manual following the turbine trip.

The root cause of the event is personnel error. Plant I&C Technicians were performing the monthly Condenser Vacuum Channel Functional Test Surveillance. The technicians isolated and vented a "B" Trip System condenser vacuum pressure switch before the Plant Reactor Operator had been notified to reset the "A" Trip System which was still tripped from the previously tested channel. If the technicians had followed the procedure step-by-step, this event would not have occurred.

There were two significant contributing causes: first, the pressure switches are located adjacent to a High Radiation Area and the I&C Technicians had been told by a Plant Health Physics Technician to finish as quickly as possible, and the switches are located in a High Noise Area which made person-to-person communications difficult. Secondly, the procedure being used had work instructions for testing the pressure switches in both the "A" and "B" Trip Systems. A program has been in place (90 percent complete prior to this event) to revise procedures so that only components in one Trip System are tested in a procedure.

A failed reed switch on the position-indicating probe (PIP) caused the loss of

position indication for control Rod 10-27. The failed reed switch was jumpered and position indication restored. The problems with RCIC-V-22 were the thermal overloads tripped and the position-indicating limit switches were out of adjustment. The overloads were reset and the limit switches adjusted. Both the dry and wet leg of the narrow-range suppression pool level instrument were blown back and level indication restored. It was determined that the Turbine Bypass Valves correctly shifted to Manual on a perceived pressure transmitter failure (the actual steam line pressure loss was due to the MSIVs closing) and locked in Manual due to the operating configuration of running Turbine Governor Valve Number Four in the Test Mode. A memorandum will be issued to Plant Operations to explain what happened and appropriate operator actions if the situation should occur again. The pressure switch for MS-RV-3B was recalibrated. While performing the recalibration, it was determined that the setpoint on the pressure switch had drifted down to 1060 psig.

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The technicians who initiated this event were counseled and received disciplinary action. The Plant Maintenance Manager issued a memorandum to all Maintenance personnel that each person working the surveillance should have a copy of the procedure and the procedure should be performed in the step-by-step sequence. The Plant Condenser Vacuum Channel Functional Surveillance Procedure was separated by Trip System into two procedures.

Acceptable work practices for communication in high noise areas will be included in a Plant document or by training. The separation by Trip System of all RPS and NSSSS Surveillance Procedures will be accelerated. The Control Rod Position Indicating Probe will be replaced or repaired during the Spring 1988 Refueling Outage. A memorandum will be written describing the Turbine Bypass Valve shift to Manual. The calibration interval for the pressure switch for MS-RV-3B will be increased to quarterly until a replacement switch can be found, purchased, and installed.

There is no safety significance associated with the event. The closing of the MSIVs at rated power is an anticipated Plant transient and this event was within the predicted event boundaries.

#### Plant Conditions

Power Level - 100%

Plant Mode - 1 - Power Operation

#### Event

On February 4, 1988, while operating at rated power, at 0150 (01:50:00) hours,

Plant Instrument and Control (I&C) Technicians inadvertently caused the Main Steamline Isolation Valves (MSIVs) to close, which in turn caused the Reactor to scram when the MSIVs reached the 10 percent-closed position.

At the time of the event, the I&C Technicians were performing the monthly Condenser Vacuum Channel Functional Surveillance Procedure (PPM 7.4.3.2.1.4.1). The Technicians had just completed the "A" channel when one of the two Technicians working the surveillance isolated and vented the "B" channel before the Plant Reactor Operator was notified to reset the "A" channel at the Control Room panel. With both the "A" and "B" channels tripped the Group 1 Nuclear Steam Supply Shutoff System (NSSSS) MSIV closure logic was met and the Outboard Main Steamline (MSL) Drain Isolation logic was met. The Inboard MSL Drain Valve NSSSS Group 1 logic requires both the "C" and "D" channels to be tripped.

(End of Abstract)

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The immediate Plant response was as expected. All four MSIV closure Reactor Protection System (RPS) channels tripped when the MSIVs reached their 10 percent closed position (at 1:50:08). At 1:50:11, both a Reactor Low Water Level (Level 3) RPS Trip and a Reactor High Pressure RPS Trip (1037 psig) occurred. Between 1:50:11 and 1:50:13, four of the 18 MSL Safety Relief Valves (SRVs) lifted, and the maximum event reactor pressure, 1085 psig, and minimum event reactor water level, -41 inches, were reached. At 1:50:17, a Plant Reactor Operator manually initiated the Reactor Core Isolation Cooling (RCIC) System (a high-pressure water-injection system) to restore reactor water level. Initiation of the RCIC System automatically tripped the Main Turbine. Between 1:50:25 and 1:50:36, the four SRVs which automatically lifted closed and a Plant Reactor Operator opened three SRVs to control reactor pressure.

At 1:51:08 (one minute after the event initiation), the RCIC Turbine Steam Inlet valve (RCIC-V-45) closed on Reactor High Water Level (Level 8 +54.5 inches) which also caused both Reactor Feedwater pumps (RFW-P-1A and 1B) to automatically trip. At 1:51:45, the maximum water level, +78 inches, in the reactor was reached due to swell caused by the reactor pressure decrease due to the open SRVs (the bottom of the Main Steamlines is at +108 inches). At 1:52:34, reactor water level again dropped below the reactor water high level trip setpoint and the RCIC Turbine Steam Inlet valve was manually reopened by the Plant Reactor Operator and the RCIC system realigned to maintain reactor water level. Between 1:55:00 and 2:13:00, six SRVs were lifted for short periods of time to control reactor pressure. At 1405 hours (14:05:00), the RCIC System was secured and reactor water level was maintained using the Feedwater/Condensate System and reactor pressure controlled with the Turbine

Bypass valves. The Plant was maintained in Hot Shutdown (Plant Mode 3) until the Plant was restarted on February 5, 1988 at 1300 hours.

The following problems were noted by Plant Operators during the event. None of the problems noted had a major impact on the event.

- o Main Steamline Safety Relief Valve (MS-RV-3B) automatically lifted at approximately 1076 psig. The lift setpoint for this valve is 1096 psig.

- o At 0158 hours the RCIC System water supply was transferred from the Suppression Pool to the Condensate Storage Tank (CST). To maintain reduced flow to the reactor, part of the RCIC pumped water was being recirculated to the CST through the Condensate Test Return Line. During this operation, the Condensate Test Return Line Flow Control Valve (RCIC-V-22) failed to fully close. The valve position indicating lights indicated the valve was closed (red "Open" light extinguished and green "Closed" light lit). Operators were able to maintain the desired return line flow using a second valve in the line, the Condensate Test Return Line Shut-Off Valve (RCIC-V-59).

- o Control Rod 10-27 gave an XX position indication (XX means the Rod Position Indication System (RPIS) cannot determine the rod position) after the scram. Plant Reactor Operators tried to insert the rod but could not get any movement which indicated the rod was fully inserted. The Shift Technical Advisor (STA) was later able to show that the rod was fully inserted using autoscramtimer data. The Autoscramtimer is a computer system which records and computes individual rod scram times.

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- o The narrow-range suppression pool level indicating recorder (CMS-LR-3) followed the suppression pool level increase due to the SRV actuations, but when the suppression pool level was later reduced, it did not follow the reduction in level. The Operator has a redundant narrow-range suppression pool level indicating recorder which did follow the level reduction.

- o The Main Turbine Bypass valves shifted to Manual and when shifted back to Auto would not stay in Auto. This had no impact on the event because the MSIVs were closed and reactor pressure was being controlled by the Plant Reactor Operators use of SRVs. The Bypass Valve control was returned to Auto at 0548 hours prior to the MSIVs being unisolated.

#### Immediate Corrective Actions

Plant Reactor Operators manually initiated the RCIC System to restore and

maintain reactor water level and they manually operated the SRVs to control reactor pressure.

A Plant System Engineer determined that the reed switch for Position 12 had failed on the Position Indicating Probe (PIP) for Control Rod 10-27. The position 12 reed switch was jumpered and the Full-In position indication restored. The reed switch is manufactured by General Electric, Inc., Model number 149A4527P002.

Plant Electrical Technicians found the thermal overloads tripped and the position-indicating limit switches out of adjustment for RCIC-V-22. The overloads were reset, the limit switches readjusted, and the valve operability verified by a functional test. The thermal overloads tripped as designed and are not an equipment failure. The limit switches are internal to the valve motor operator RCIC-MO-22. The motor operator was made by Limitorque Corp, Model Number SMB-2-60.

On February 4, 1988, Plant I&C Technicians recalibrated CMS-LR-3 and vented the dry leg of the Suppression Pool Narrow Range level transmitter CMS-LT-1. The same failure to track suppression pool level recurred again on February 7, 1988. Plant I&C Technicians blew back the sensing lines of level transmitter CMS-LT-1 and the correct reading was verified. On February 11, 1988, the suppression pool level was again lowered and the CMS-LR-3 level recorder did track the decreasing level. The level recorder is manufactured by Leeds and Northrup Co., Model Number 135 and the level transmitter is manufactured by Rosemount, Inc., Model Number 1151DP4022T0003AB. As described above, neither of these instruments actually failed.

The Turbine Bypass Valve correctly shifted to Manual due to the sensed (not real) steamline pressure transmitter failure caused by the loss of MSL pressure due to the MSIV closure. Prior to the event, the Plant was running with Turbine Governor Valve 4 in test so that its position could be manually controlled and the valve operated away from positions that cause high vibration. The Turbine Bypass Valves were prevented from being shifted back to Auto because the test signal from the governor valve prevents a reset of the pressure controller failure signal. The governor valve test signal was removed and the Bypass valves were shifted to Auto.

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The Relief Valve Pressure Switch (MS-PS-39H) which actuates MS-RV-3B was recalibrated. During the recalibration it was determined that the pressure switch setpoint had drifted down from its 1096 plus or minus 5 psig setpoint range to 1060 psig. The pressure switch is manufactured by Barksdale Valve Co., Model Number B1T-C1255-GE.

The I&C Technicians involved in this event were counseled and received disciplinary action.

The Plant Condenser Vacuum Channel Functional Surveillance Procedure, PPM 7.4.3.2.1.4.1, has been separated into two procedures separated by Trip System.

The Plant Maintenance Manager issued a memorandum to all Maintenance personnel directing that each person working a surveillance procedure should have a copy of the procedure and follow the step-by-step sequence in the procedure.

#### Further Evaluation and Corrective Action

There were no structures, components, or systems that were inoperable at the start of the vent that contributed to the event. It should be noted that the RCIC System was aligned to take its suction supply water from the suppression pool as described in Licensee Event Report 88-02. This alignment does not affect RCIC System operability. Secondly, as described above, Turbine Governor Valve Number Four was opened using the valve test mode to position the valve to prevent excessive vibration.

The scram data was reviewed against the MSIV Isolation Power Ascension Test Acceptance Criteria and the MSIV closure event described in the FSAR, Chapter 15, Section 2.4. All the event data, with the exception of the MSIV closure times explained below, met the Power Ascension Test Acceptance Criteria and was within the FSAR event description boundaries. The MSIV closure time criteria could not be verified because only MSIV closure data recorded at one-second intervals was available and this data is not accurate enough to use for calculating MSIV closure times. The one-second data was reviewed and does show that the times recorded are as expected and does provide evidence that the valves met this criteria.

During the event six trip setpoints were reached. The following is a review of each trip and its associated actions.

The low condenser vacuum signal (7 inches Hg.), caused by the I&C Technicians, caused a Group 1 NSSSS isolation. NSSSS Group 1 consists of the eight MSIVs (four inboard and four outboard of the containment) and six Main Steamline Drain Valves. All valves isolated during the event except for the one inboard MSL Drain Valve. The inboard MSL Drain Valve logic is two out of two and consists of Channels "C" and "D," which did not trip during the event.

The MSIVs closing from the 100 percent-Open to the 90-percent-Open position causes an RPS actuation. All four MSIV closure RPS channels tripped and initiated the reactor scram. No other actuations are associated with this trip signal.

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The Reactor Low Water Level (Level 3) trip setpoint, +13 inches, was reached twice during the event: once during the initial reactor pressure transient and again later due to the manual SRV blowdown and the loss of RCIC due to the high reactor water level RCIC System shutdown. The actuations associated with a low-level trip are: RPS actuation (reactor scram signal), the Reactor

Recirculation pumps (RRC-P-1A and 1B) trip to slow speed, Automatic Depressurization System (ADS) permissive signal, and NSSSS Groups 5 and 6 isolate. The reactor scram channels tripped, the pumps did trip to slow speed, and NSSSS Groups 5 and 6 were already closed in their isolation positions. NSSSS Group 5 consists of Residual Heat Removal (RHR) valves and Traversing Incore Probe withdrawal and Group 6 consists of RHR Shutdown Cooling Valves.

The Reactor High Pressure RPS trip setpoint of 1037 psig was reached within seconds of the MSIV closures and all four high-pressure channels did trip. No other actuations are associated with this setpoint.

The Reactor High Water Level (Level 8) trip setpoint, +54.5 inches, was reached as a result of the level swell due to the reactor pressure decrease associated with the opening of the SRVs during the event. Level 8 actuations include tripping the Main Turbine and Feedwater Pumps (RFW-P-1A and 1B) and closing the High Pressure Core Spray Injection Valve (HPCS-V-4) and RCIC Turbine Steam Stop Valve (RCIC-V-45). The Feedwater Pumps did trip as a result of the high water level trip and RCIC-V-45 did close. The Main Turbine had previously tripped due to the RCIC System initiation and, since there was no HPCS injection during this event, HPCS-V-4 was closed throughout the event.

Three SRVs automatically opened during the event when their trip setpoint was reached. Initially both MS-SRV-1C and 1B opened (setpoint 1076 psig) and one second later MS-RV-2C (setpoint 1086 psig) opened. The maximum recorded pressure during the event was 1085 psig. Three other SRVs (MS-RV-1A, 2B, and 1D) have a trip setpoint of 1086 psig but did not automatically open. The auto opened SRVs all closed within their pressure switch reset tolerances.

The root cause of this event is personnel error in that the Plant I&C Technicians did not follow in a step-by-step manner the approved Plant Surveillance Procedure. The procedure provides specific steps designed to ensure that each channel is placed back into operation before the next channel is taken out of service. The I&C technician at the condenser vacuum pressure switches did not have a copy of the procedure and was depending on the other technician for work instructions. The I&C Technician closed and vented the "B" Channel Pressure switch out of sequence with the procedure steps.

A contributing cause to the event was the I&C Technicians did not establish adequate communications and the Technician at the pressure switches thought he had been given an "OK" signal to isolate the second channel while, in fact, the signalling Technician intended for him to wait while he telephoned to get the "OK" from the Plant Reactor Operator that the first channel was reset. The working area was in a high-noise area (greater than 90 decibels) and immediately adjacent to a high radiation area within sight of the flashing amber beacon. A Plant Health Physics Technicians asked the I&C Technicians to finish the surveillance as quickly as possible.

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A second contributing cause of the event was the procedure being used had not yet been separated into two procedures, one for each Trip System. As a result of previous events, all Plant PRS and NSSSS Surveillance Procedures were being separated so that only one Trip System would be affected by the performance of a procedure. At the time of this event, this task had been accomplished for 90 percent of the procedures.

#### Corrective Actions

Acceptable work practices for communications in high-noise areas will be included in the Shop Work Practices Manual, other suitable Plant document, or by training.

The divisionalization of all RPS and NSSSS Surveillance Procedures will be accelerated.

The PIP for Control Rod 10-27 will be replaced during the Spring 1988 Refueling Outage.

A memorandum describing the shifting of the Turbine Bypass Valves to Manual and the circumstances which prevented it from being shifted back to Auto will be described along with the appropriate operator actions to be taken if it should occur again.

The equipment history of pressure switch (MS-PS-39H) was reviewed and it was determined that this switch had drifted high in each of the two previous calibrations. The frequency of calibration of pressure switch (MS-PS-39H) will be increased from once every two years to quarterly. This pressure switch will be replaced when a suitable replacement switch is found and procured.

#### Similar Events

None.

### Safety Significance

There is no safety significance associated with this event. The closing of the MSIVs at rated power is an anticipated Plant transient, and the capability of the Plant to handle this transient was demonstrated during the Power Ascension Testing Program. This event was reviewed against the acceptance criteria of the MSIV Isolation Power Ascension Test and all parameters, except for the MSIV closure times, are within the acceptance criteria. As explained in the Further Evaluation Section of this LER, the MSIV closure data available for analysis was not accurate enough to verify the closure times. The Plant response was as expected in that the Plant scrambled on MSIV closure and the Main Steamline Safety Relief Valves automatically opened to limit the reactor pressure transient. The RCIC system was manually initiated to inject water to the reactor vessel. None of the Plant problems identified during the event had any safety significance. The event posed no threat to the safety of Plant personnel or the public.

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### EIIS Information

Text Reference EIIS Reference  
System Component

Main Steamline Isolation Valves (MSIVs) SB ISV  
Reactor AC RCT  
Nuclear Steam Supply Shutoff System (NSSSS) NH  
(Groups 1, 5, and 6)  
Main Condenser Vacuum Trip System SH  
Reactor Protection System (RPS) JC  
Main Steamline Safety Relief Valves (SRVs) SB RV  
(MS-RV-1A, 1B, 2B, 3B, 1C, 2C, and 1D)  
Reactor Core Isolation Cooling System (RCIC) BN  
Main Steamlines (MSL) SB PSP  
Reactor Recirculation Pumps (RRC-P-1A and 1B) AD P  
Main Turbine TA TRB  
Reactor Feedwater Pumps (RFW-P-1A and 1B) SK P  
RCIC Condensate Test Return Flow Control Valve BN FCV  
(RCIC-V-22)  
Control Rod (CRD-10-27) AA JC  
Narrow Range Suppression Pool Level Indicating BT LR  
Recorders (CMS-LR-3)  
Turbine Bypass Valve Control JJ PC  
Condenser Vacuum Pressure Switch SH PS

Reed Switch AA ZE  
Position Indicating Probe (PIP) AA ZIS  
Thermal Overloads BN  
Position Indicating Limit Switches BN ZIS  
(Associated with RCIC-MO-22) BN MO  
Turbine Bypass Valves SO PCV  
Turbine Governor Valve TA SCV  
Relief Valve Pressure Switch for MS-RV-3B SB PS  
(MS-PS-39H)  
RCIC Turbine Steam Inlet Valve (RCIC-V-45) BN SHV  
Feedwater/Condensate System SJ/SD  
Suppression Pool BT  
Condensate Storage Tank (CST) KA TK  
Valve Position Indicating Lights BN ZI  
Condensate Test Return Line Shut-off Valve BN SHV  
(RCIC-V-59)  
Rod Position Indication System (RPIS) AA ZI  
Auto Scram Timer AA CPP  
Suppression Pool Narrow Range Level Transmitter BT LT  
(CMS-LT-1)  
Automatic Depressurization System (ADS)  
Residual Heat Removal (RHR) BO  
Transversing Incore Probe (TIP) IG  
RHR Shutdown Cooling Valves ISV  
High Pressure Core Spray Injection Valve BG INV  
(HPCS-V-4)

ATTACHMENT # 1 TO ANO # 8803140157 PAGE: 1 OF 1

WASHINGTON PUBLIC POWER SUPPLY SYSTEM  
P.O. Box 968 3000 George Washington Way Richland, Washington 99352

Docket No. 50-397

March 7, 1988

Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Subject: NUCLEAR PLANT NO. 2  
LICENSEE EVENT REPORT NO. 88-03

Dear Sir:

Transmitted herewith is Licensee Event Report No. 88-03 for the WNP-2

Plant. This report is submitted in response to the report requirements of 10CFR50.73 and discusses the items of reportability, corrective action taken, and action taken to preclude recurrence.

Very truly yours,  
/s/ R. L. Corcoran for  
C.M. Powers (M/D 927M)  
WNP-2 Plant Manager

CMP:sm  
Enclosure:  
Licensee Event Report No. 88-03

cc: Mr. John B. Martin, NRC - Region V  
Mr. C.J. Bosted, NRC Site (M/D 901A)  
INPO Records Center - Atlanta, GA  
Ms. Dottie Sherman, ANI  
Mr. D.L. Williams, BPA (M/D 399)

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